

# *pacific* **ENSO** *update*

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**A Quarterly Bulletin of the Pacific El Niño/Southern Oscillation Applications Climate (PEAC) Center  
Providing Information on Climate Variability for the U.S.-Affiliated Pacific Islands**

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## **CURRENT CONDITIONS**

During the first half of 2012, La Niña ended and the climate state of the tropical Pacific became ENSO-neutral. With the central and eastern equatorial Pacific sea-surface and sub-surface waters undergoing a gradual warming, El Niño is expected to develop in the second half of 2012. The atmosphere however, has yet to exhibit strong signals of impending El Niño, and in fact, the unusual tranquil weather similar to what has been observed over the past decade has persisted. The monsoon has been weak or absent, rainfall throughout most of Micronesia has been near normal (see figure 1 on page 2), and there have been few notable extremes of climatic elements, except for persistently high sea levels. At nearly all recording locations, the rainfall during the first half of 2012 was much less than during the first half of 2011 when a similar shift of La Niña to ENSO-neutral occurred. Abundant rainfall typically occurs in years that begin as La Niña and transition to ENSO-neutral or to El Niño sometime later in the year. The recent high rainfall at Kapingamarangi (located close to the Equator) is one climatic item that is typical of the early stages of El Niño. Another typical harbinger of El Niño observed in the first half of 2012 was a spate of tropical cyclone developments in May and June; but this did not persist, and the tropics once again became unusually quiet during July. Because of the recent decadal trend toward reduced numbers of tropical cyclones in the western North Pacific basin, the City University of Hong Kong Laboratory for Atmospheric Research declined to issue further outlooks for tropical cyclone activity there until the cause of the recent trend can be established and incorporated into the forecasts (see the tropical cyclone discussion on page 3 for more information).

During July 2012, two consecutive hurricanes (Daniel and Emilia) formed in the eastern Pacific Ocean and progressed westward toward the central Pacific. However, neither system had a significant impact on the Hawaiian Islands, as they encountered unfavorable environmental sea surface temperature and wind shear conditions in the central Pacific. The Lihue, Honolulu, Kahului, and Hilo

airport observing sites look to finish the month of July with well below-normal rainfall.

The following comments from the **EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION** were posted on the U.S. Climate Prediction Center/NCEP and the International Research Institute (IRI) for Climate and Society web site on July 5th, 2012:

### **ENSO Alert System Status: El Niño Watch**

“Synopsis: Chances increase for El Niño beginning in July-September 2012.

During June 2012, ENSO-neutral continued as reflected in both the oceanic and atmospheric anomalies. However, positive equatorial Pacific sea surface temperature (SST) anomalies have grown, exceeding +0.5°C across the eastern Pacific Ocean by the end of June. SST anomalies increase moving from the westernmost Niño 4 region to the Niño 1+2 region adjacent to South America, which remained near +1.5°C during the month. The oceanic heat content anomalies (average temperature in the upper 300m of the ocean) increased during June, as above-average sub-surface temperatures became more entrenched in the equatorial Pacific. This warming was consistent with a weakening of the low-level trade winds across the east-central equatorial Pacific, along with a weakening of the persistent pattern of enhanced convection near Papua New Guinea. The observations are consistent with ENSO-neutral, but reflect a likely progression towards El Niño.

There continues to be a substantial disparity between the statistical and dynamical model SST forecasts for the Niño -3.4 region. The dynamical models, including the NCEP Climate Forecast System, largely favor the development of El Niño by July-September 2012, while the majority of statistical models predict ENSO-neutral through the rest of 2012. The forecaster consensus largely favors the dynamical model outcome because those models tend to exhibit greater skill emerging from the Northern Hemisphere “spring barrier”, and also due to the strengthening of observed signals indicating an evolution towards El Niño.”

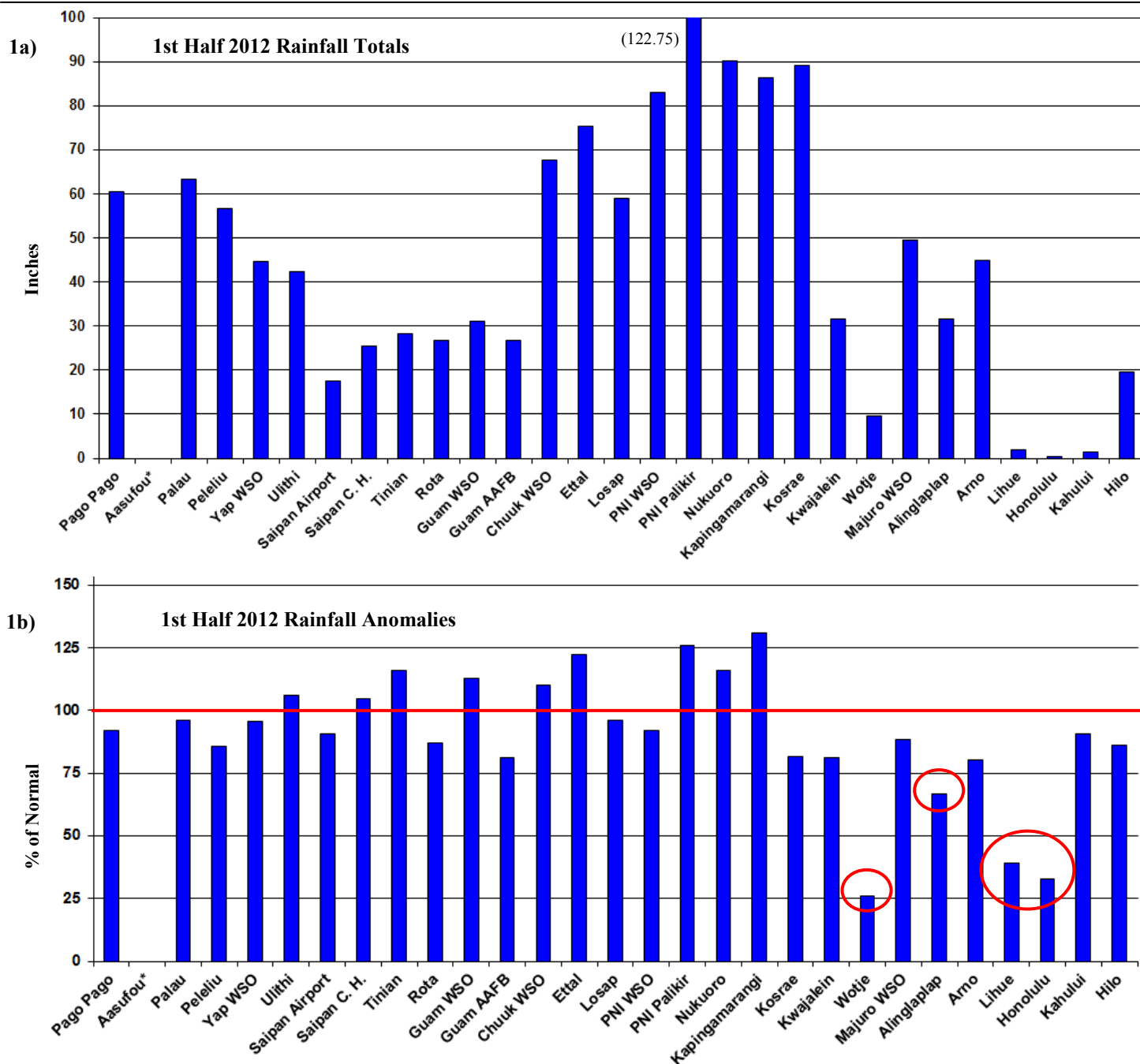
## SEA SURFACE TEMPERATURES

La Niña dissipated during April 2012, as below-average SSTs weakened across most of the equatorial Pacific Ocean and above-average SSTs persisted in the east. ENSO-neutral conditions prevailed in May 2012, following the dissipation of La Niña. During June 2012, ENSO-neutral conditions continued as reflected in both the oceanic and atmospheric anomalies. However, positive equatorial Pacific sea surface temperature (SST) anomalies had grown, exceeding  $+0.5^{\circ}\text{C}$  across the eastern Pacific Ocean by the end of June. This warming was consistent with a weakening of the low-level trade winds across the east-central equatorial Pacific, along with a weakening of the persistent pattern of enhanced convection near Papua New Guinea. The observations are consistent with ENSO-neutral, but reflect a likely progression towards El Niño.

## SOUTHERN OSCILLATION INDEX

The 3-month average of the Southern Oscillation Index for the second quarter of this year was  $-0.2$ , with monthly values of  $-0.3$ ,  $0.0$ , and  $-0.4$  for the months of April, May, and June (AMJ) 2012, respectively. Over the last few months, SOI observations have been trending toward a larger negative value and closer to El Niño. The shift of SOI values from  $-0.3$  to  $0.0$  to  $-0.4$  over the AMJ months of 2012, indicate a hovering near the threshold of an El Niño.

Normally, positive SOI values in excess of  $+1.0$  are associated with La Niña conditions, and negative SOI values below  $-1.0$  are associated with El Niño conditions. Low SOI values suggest a weak coupling between the ocean and the atmosphere. The SOI is an index representing the normalized sea-level pressure difference between Darwin, Australia, and Tahiti, respectively.



**Figure 1**, above. 1st Half 2012 rainfall totals (a) in inches and (b) anomalies (expressed as % of normal). In 1b, solid line indicates normal rainfall (100%) and circles indicate rainfall less than 75% of normal. \* Missing data.

## TROPICAL CYCLONE

The PEAC archives western North Pacific tropical cyclone numbers, track coordinates, and 1-minute average maximum sustained wind taken from operational warnings issued by the Joint Typhoon Warning Center (JTWC) of the U. S. Air Force and Navy, located at Pearl Harbor, Hawaii. Western North Pacific tropical cyclone names are obtained from warnings issued by the Japan Meteorological Agency (JMA), which is the World Meteorological Organization's Regional Specialized Meteorological Center (RSMC) for the western North Pacific basin. The PEAC archives South Pacific tropical cyclone names, track coordinates, central pressure, and 10-minute average maximum sustained wind estimates from advisories issued by RSMCs at Brisbane, Nadi, Wellington and Port Moresby. The numbering scheme for Southern Hemisphere tropical cyclones and the 1-minute average maximum sustained wind estimates are taken from warnings issued by the JTWC, which has a warning responsibility to its constituency across the South Pacific and South Indian oceans that overlaps the local centers. Tropical cyclone advisories for eastern North Pacific tropical cyclones are provided by RSMC Miami, and tropical cyclone advisories for the central North Pacific (140° W to the 180° meridian) are provided by RSMC Honolulu. There are some-time differences in the statistics (e.g., storm maximum intensity) for a given tropical cyclone between the JTWC and the local centers that are noted in this summary.

**Tropical Cyclone Summary**

Thanks to an active May and June, tropical cyclone activity in the western North Pacific was above normal during the first half of 2012. Through the end of June 2012, the JTWC had numbered seven significant tropical cyclones. Of these, the JMA named six. Of the seven JTWC significant tropical cyclones, four became typhoons, two became tropical storms, and one remained a tropical depression. Of the four typhoons, one of them (Guchol (05W)) became a super typhoon as it moved northward while east of Luzon. Guchol later made landfall along the southern coast of Japan. Three of the seven early season tropical cyclones stayed in or near the South China Sea. Four of them: Typhoon (TY) Sanvu (03W), TY Mawar (04W), Super Typhoon (STY) Guchol (05W), and Tropical Storm (TS) Doksuri (07W), developed from tropical disturbances that passed through Micronesia. Guam was placed under a tropical storm warning as Typhoon Sanvu (a tropical storm at that time) passed to the southwest. Winds reached 40 mph in gusts and several inches of rain occurred over the few days that this cyclone was near. STY Guchol formed to the southeast of Guam, but unlike Sanvu a couple of weeks earlier, moved on a more westerly track and passed near Ulithi in Yap State just as it was becoming a tropical storm.

Tropical cyclone activity in the eastern North Pacific (EastPAC) has been near normal, with six cyclones named by the National Hurricane Center in Miami through mid-July. Of the six named cyclones, five became hurricanes, while one (TS Aletta) reached a peak of only 40 kt. Two of the EastPAC hurricanes (Daniel (04E) and Emilia (05E)) crossed 140° W into the RSMC Honolulu area of responsibility. Both of these were weakening and dissipated shortly after crossing 140° W, and posed no threat to Hawaii. No tropical cyclones formed in the RSMC Honolulu area of responsibility.

The Southern Hemisphere cyclone season of 2011-2012 ended well below average in most categories of activity. The JTWC numbered only 21 tropical cyclones for the South Indian Ocean and South Pacific combined, versus a normal of 28. The RSMCs of the Southern Hemisphere named only 17 of these, with RSMC Fiji naming two, the three RSMCs of Australia (Brisbane, Perth and Darwin) naming five, and RSMC La Reunion naming the other ten in its area of responsibility in the South Indian Ocean.

**PEAC Center Tropical Cyclone Assessment**

The TSR (Tropical Storm Risk) consortium<sup>1</sup> places the odds of lower, middle and upper terciles for western North Pacific tropical cyclone activity during 2012 at 16-39-45, respectively. This is a forecast biased toward above-normal activity, although the TSR forecasted numbers look to be just slightly above normal in the table below.

**NW Pacific ACE Index and System Numbers in 2012**

	ACE Index	Intense Typhoons	Tropical Typhoons	Storms
TSR Forecast (±FE)	324 (±90)	9.2 (±2.4)	16.7 (±3.4)	26.8 (±4.2)
47yr Climate Norm (±SD) 1965-2011	295 (±106)	8.4 (±3.0)	16.3 (±3.8)	26.2 (±4.6)
Forecast Skill at this Lead	<b>27%</b>	<b>36%</b>	<b>21%</b>	<b>16%</b>

In a telling sign of the times, the climate research center at the City University of Hong Kong has declined to issue a forecast of western North Pacific TC activity until the reasons for the recent decadal trend to very low activity can be determined. As of May 2012, experimental forecasts for the annual total of western North Pacific TC activity issued by Paul Stanko (Senior forecaster, Guam WFO) indicated that the most likely category of 2012 TC activity would be “near normal” (among seven groupings ranging from “record high” to “record low”).

Given the available guidance<sup>1</sup>, the PEAC anticipates that the tropical cyclone activity for the remainder of 2012 will be slightly above normal in the western North Pacific basin and near normal within Micronesia. The level of threat to individual islands is included in their local variability summaries. Given the recent lack of cyclone activity, a normal distribution of tropical cyclones may seem like quite a busy year for some locations in Micronesia. If El Niño develops quickly and were to become moderate or strong (although a strong El Niño is not anticipated at this time), then the tropical cyclone distribution for Micronesia in the latter half of 2012 could be above normal, with several serious threats to many islands. With a similar frame of mind as the Hong Kong forecasters, it is not clear to us how the recent trend to low activity will temper the typical effects of El Niño to raise the level of tropical cyclone activity within Micronesia. Outlooks for the level of activity in the next Southern Hemisphere cyclone season will appear in next quarter's ENSO Newsletter.

<sup>1</sup> The PEAC tropical cyclone forecasts for 2012 are based on forecasts of the status of ENSO and input from three seasonal outlooks for tropical cyclone activity in the western North Pacific basin: (1) The Guam Weather Forecast Office (WFO), (2) The City University of Hong Kong Laboratory for Atmospheric Research, under the direction of Dr. J. C-L. Chan, and (3) The Benfield Hazard Research Centre, University College London, TSR research group, UK, led by Dr. Adam Lea and Professor Mark Saunders.

## LOCAL SUMMARY AND FORECAST



**American Samoa:** American Samoa is now passing through the heart of its dry season. The 2011-2012 rainy season saw nothing out of the ordinary. Rainfall was near normal, and there were no damaging tropical cyclones. Recent strong southeast trade winds were a factor in driving sea levels higher in the harbor at Pago Pago (see the sea-level discussion on pages 10-11).

American Samoa Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	Jun.	2nd Qtr	1st Half
Pago Pago WSO	Inches	8.41	12.15	6.13	26.69	60.61
	% Norm	70%	122%	83%	91%	92%
Aasufou	Inches	23.02	*	*	*	*
	% Norm	130%	*	*	*	*

\* Missing data

**Climate Outlook:** Climate models and simple persistence of current conditions favor a continuation of near-normal rainfall over the next three-month period. The next rainy season (Oct 2012 - Apr 2013) is anticipated to have a normal or early onset with above-average rainfall. Weak El Niño conditions persisting through the latter half of 2012 should favor abundant rainfall and above-average tropical cyclone activity in the waters from Fiji through Tonga and into American Samoa. The risk of tropical cyclones in the regional waters of American Samoa becomes non-negligible in late November 2012, and an above-normal risk will persist through early 2013.

Predicted rainfall for American Samoa from July 2012 through June 2013 is:

Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>
July - September 2012 (Heart of Dry Season)	100% (19.68 inches - Pago Pago)
October - December 2012 (Onset of next Rainy Season)	120%
January - March 2013 (Heart of next Rainy Season)	120%
April - June 2013 (Onset of next Dry Season)	100%

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



**Guam/CNMI:** Throughout Guam and the CNMI, the rainfall during the first half of 2012 was generally near normal, ranging from a dry 81% of average at AAFB to a wetter 116% of average at Tinian. At most locations on Guam and in the CNMI, the rainfall totals during the first half of 2012 were nearly ten inches less than during the first half of 2011. April 2012 was very dry throughout the region, while May 2012 was wet. During the third week of May, TS Sanvu passed just to the southwest of Guam and deposited upwards of four inches of rain island-wide over three or four days. This represented over half the May total. Saipan's relatively modest six-month rainfall total of 17.60 inches (90%) was the lowest reading in the region. The six-month reading of 37.30 inches at the Ugum Watershed

## LOCAL SUMMARY AND FORECAST

site in Guam's southern mountains was the highest reading in the region. No extraordinary short period rainfall events were experienced during the first half of 2012, with zero occurrences of two inches or more rainfall in 24 hours at both Guam WSO and Saipan International Airport. During July, the weather became tranquil across Guam and the CNMI, and rainfall amounts fell below normal. The southwest monsoon has so far failed to reach Guam, and tropical cyclone activity (busy in the western Pacific basin in May and June) became unusually quiet during July, with one weak tropical storm (Khanun) forming well north-west of the islands. At the time of this writing (July 24) another typhoon (Vicente) had just made landfall west of Hong Kong.

Dry conditions at Saipan through April of 2012 resulted in desiccated vegetation, brown grass, and dusty roadsides. On Guam, there was enough rain to keep lawns green, and wildfires were infrequent and relatively small. The rainy season seemed to be off to a good start with a wet May and June, but during July the rains let up, and the islands await the start of persistent heavier rains normally seen during the heart of the rainy season.

Guam and CNMI Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	Jun.	2nd Qtr	1st Half
Guam						
GIA (WFO)	Inches	3.05	7.63	6.63	17.31	31.11
	% Norm	78%	126%	102%	105%	113%
AAFB	Inches	1.21	8.46	5.41	15.08	26.60
	% Norm	25%	128%	85%	85%	81%
Dededo (Ypapa)	Inches	1.42	8.88	6.15	16.45	33.46
	% Norm	29%	135%	97%	92%	102%
Ugum Watershed	Inches	2.57	7.56	10.86	20.99	37.30
	% Norm	53%	106%	167%	115%	112%
Sinajaña	Inches	3.22	9.44	6.46	19.12	31.51
	% Norm	81%	157%	101%	117%	114%
CNMI						
Saipan Intl. Airport	Inches	0.92	3.96	4.26	9.14	17.60
	% Norm	33%	90%	92%	79%	90%
Capitol Hill	Inches	1.15	11.82	5.37	18.34	25.46
	% Norm	33%	215%	93%	124%	105%
Tinian Airport	Inches	2.44	9.78	4.47	16.69	28.18
	% Norm	70%	178%	77%	113%	116%
Rota Airport	Inches	1.64	9.45	6.62	17.71	26.74
	% Norm	36%	149%	100%	104%	87%

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**Climate Outlook:** Guam and the CNMI depend on tropical cyclone activity and the southwest monsoon for much of their rainy season rainfall. As El Niño builds in the Pacific basin, we anticipate that the monsoon will eventually be invigorated by at least early August, and reach Guam and the CNMI. At least two or three week-long episodes of the southwest monsoon should sweep across Guam and the CNMI sometime from now through October. Also, two or three tropical storms and one typhoon are forecasted to pass within 180 NM of Guam and Saipan, with the greatest cyclone risk later in the year (October through December). This is near normal tropical cyclone activity for the complete historical record. Because recent years have had very low tropical cyclone activity in the western North Pacific basin, there has been a dramatic reduction in the numbers of tropical cyclones affecting Guam and the CNMI. A normal number of cyclones passing through regional waters will likely be perceived as unusually active. A degree of complacency sets-in when the weather has been so pleasant and uneventful for so long.

Predicted rainfall for the Mariana Islands from July 2012 through June 2013 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>	
	Guam/Rota	Saipan/Tinian
July - September 2012 (Heart of Rainy Season)	<b>120%</b> <b>(45.30 inches)</b>	<b>120%</b> <b>(40.92 inches)</b>
October - December 2012 (End of Rainy Season)	<b>120%*</b>	<b>120%*</b>
January - March 2013 (Onset of Next Dry Season)	<b>90%</b>	<b>80%</b>
April - June 2013 (2nd Half of Next Dry Season)	<b>80%**</b>	<b>70%**</b>

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

\* Value based on high likelihood of a nearby typhoon.

\*\* Value based on the typical dryness after an El Niño event.

**Federated States of Micronesia**

**Yap State:** During the first half of 2012, rainfall was near normal across most of Yap Island, with all but one location (Maap) having a six-month total within five inches of the WSO average of 46.78 inches. In the outer islands, the 2012 first-half rainfall at Ulithi was near normal. Woleai was moderately drier than normal, with a very dry January accounting for approximately half of the deficit in the first-half total. One of the basin's named tropical cyclones (STY Guchol) passed very close to Ulithi on 21-22 June while it was in its early stages of development, providing abundant rainfall and some gusty winds. The name "Guchol" was assigned to tropical cyclone 05W by the Japan Meteorological Agency using a list of tropical cyclone names that has been populated with contributions from nearly all the typhoon-prone countries of the western North Pacific. In this case, the name "Guchol" was provided by Micronesia, and is the Yapese word for the spice turmeric. No

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significant damage or injuries were reported for this tropical cyclone during its passage through Yap State.

Yap State Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
<b>Yap Island</b>						
<b>Yap WSO</b>	<b>Inches</b>	5.00	11.14	11.95	<b>28.09</b>	<b>44.72</b>
	<b>% Norm</b>	86%	123%	94%	<b>102%</b>	<b>96%</b>
<b>Dugor</b>	<b>Inches</b>	3.33	13.02	12.34	<b>28.69</b>	<b>47.07</b>
	<b>% WSO</b>	58%	144%	97%	<b>104%</b>	<b>101%</b>
<b>Gilman</b>	<b>Inches</b>	4.86	11.95	14.84	<b>31.65</b>	<b>50.16</b>
	<b>% WSO</b>	84%	131%	117%	<b>115%</b>	<b>107%</b>
<b>Luweech</b>	<b>Inches</b>	3.53	7.70	15.45	<b>26.68</b>	<b>41.02</b>
	<b>% WSO</b>	61%	85%	122%	<b>97%</b>	<b>88%</b>
<b>Maap</b>	<b>Inches</b>	6.04	5.08	11.27	<b>22.39</b>	<b>33.30</b>
	<b>% WSO</b>	105%	56%	89%	<b>81%</b>	<b>71%</b>
<b>North Fanif</b>	<b>Inches</b>	4.26	9.63	14.73	<b>28.62</b>	<b>49.68</b>
	<b>% WSO</b>	74%	106%	116%	<b>104%</b>	<b>106%</b>
<b>Rumung</b>	<b>Inches</b>	3.40	12.99	13.36	<b>29.75</b>	<b>45.95</b>
	<b>% WSO</b>	59%	143%	105%	<b>108%</b>	<b>98%</b>
<b>Tamil</b>	<b>Inches</b>	3.78	16.09	10.19	<b>30.06</b>	<b>46.15</b>
	<b>% WSO</b>	66%	178%	80%	<b>109%</b>	<b>99%</b>
<b>Outer Islands</b>						
<b>Ulithi</b>	<b>Inches</b>	3.98	8.48	12.20	<b>24.66</b>	<b>42.22</b>
	<b>% Norm</b>	81%	110%	113%	<b>105%</b>	<b>106%</b>
<b>Woleai</b>	<b>Inches</b>	6.19	10.75	9.22	<b>26.16</b>	<b>49.62</b>
	<b>% Norm</b>	56%	88%	71%	<b>72%</b>	<b>79%</b>

**Climate Outlook:** A continuation of near normal to above normal rainfall is anticipated for all islands of Yap State for at least the next three months and probably through the end of the year. Rainfall patterns and the basin's tropical cyclone distribution during a weak El Niño climate favor wet conditions on Yap and a normal risk of a typhoon. The odds of gale-force winds or greater from a tropical cyclone on Yap Island or any of its northern atolls, will be near normal (roughly 10-15%). Dry conditions often become established within Yap State toward the end of an El Niño year, and extend into the first few months of the year that follows. The rainfall forecasts below reflect this scenario.

Predicted rainfall for Yap State from July 2012 through June 2013 is as follows:

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Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>	
	Yap and Ulithi	Woleai
July - September 2012 (Heart of Rainy Season)	<b>120%</b> <b>(51.90 inches)</b>	<b>95%</b> <b>(38.29 inches)</b>
October - December 2012 (End of Rainy Season)	<b>110%</b>	<b>95%</b>
January - March 2013 (Heart of Next Dry Season)	<b>85%</b>	<b>85%</b>
April - June 2013 (Onset of next Rainy Season)	<b>90%</b>	<b>90%</b>

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

**Chuuk State:** Rainfall was abundant throughout Chuuk State during the first half of 2012, with some locations in the Mortlock island group receiving more than 70 inches of rain during the first half of 2012. There was, as usual, a slight north-south gradient reflecting the typical placement of deep convection across the southern portions of the state in the first few months of the year. Some of the northernmost atolls (e.g., Fananu and Onoun) had some dry months early in the year, and were concerned about water supply. During May and June, there was a period of heightened convective activity in and around Chuuk State that contributed to the formation of two of the basin's early tropical cyclones (Sanvu and Guchol). This convection brought abundant rain to the region in May and June. During the first half of 2011 and also during the first half of 2012, Ta Atoll had the highest observed 6-month total rainfall within Chuuk State with 97.73 inches and 84.58 inches, respectively. Despite the heavy rainfall, there were no reports of any problems with flooding or any occurrences of landslides noted in the high islands of Chuuk Lagoon.

Chuuk State Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
<b>Chuuk Lagoon</b>						
<b>Chuuk WSO</b>	<b>Inches</b>	5.02	19.56	15.27	<b>39.85</b>	<b>67.59</b>
	<b>% Norm</b>	41%	160%	130%	<b>110%</b>	<b>110%</b>
<b>Piis Panew</b>	<b>Inches</b>	7.29	18.13	12.89	<b>38.31</b>	<b>67.10</b>
	<b>% WSO</b>	59%	148%	110%	<b>106%</b>	<b>109%</b>
<b>Southern Mortlocks</b>						
<b>Lukunoch</b>	<b>Inches</b>	8.60	12.35	14.53	<b>35.48</b>	<b>66.27</b>
	<b>% WSO</b>	70%	101%	124%	<b>98%</b>	<b>108%</b>
<b>Ettal</b>	<b>Inches</b>	7.29	9.94	13.06	<b>30.29</b>	<b>75.33</b>
	<b>% WSO</b>	59%	81%	111%	<b>83%</b>	<b>122%</b>
<b>Ta</b>	<b>Inches</b>	6.40	21.46	15.15	<b>43.01</b>	<b>84.58</b>
	<b>% WSO</b>	52%	175%	129%	<b>118%</b>	<b>138%</b>
<b>Western Atolls</b>						
<b>Polowat</b>	<b>Inches</b>	6.06	7.53	8.98	<b>16.39</b>	<b>32.59</b>
	<b>% Norm</b>	101%	84%	72%	<b>82%</b>	<b>72%</b>

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Chuuk State Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
<b>Northern Atolls</b>						
<b>Fananu</b>	<b>Inches</b>	1.64	9.39	6.60	<b>17.63</b>	<b>24.90</b>
	<b>% WSO</b>	13%	77%	56%	<b>49%</b>	<b>40%</b>
<b>Onoun</b>	<b>Inches</b>	4.82	15.53	15.12	<b>35.47</b>	<b>60.23</b>
	<b>% WSO</b>	39%	127%	129%	<b>98%</b>	<b>98%</b>
<b>Northern Mortlocks</b>						
<b>Losap</b>	<b>Inches</b>	7.75	14.62	9.33	<b>31.70</b>	<b>58.97</b>
	<b>% WSO</b>	63%	120%	80%	<b>87%</b>	<b>96%</b>
<b>Nama</b>	<b>Inches</b>	6.99	16.47	14.10	<b>37.56</b>	<b>78.76</b>
	<b>% WSO</b>	57%	135%	120%	<b>103%</b>	<b>128%</b>
<b>Namoluk</b>	<b>Inches</b>	10.27	12.17	11.68	<b>34.12</b>	<b>63.03</b>
	<b>% WSO</b>	83%	100%	100%	<b>94%</b>	<b>102%</b>

**Climate Outlook:** With the Pacific basin climate progressing into El Niño, abundant rainfall should continue throughout Chuuk State for at least the next several months. The monsoon trough should episodically extend into Chuuk State with its embedded tropical disturbances and monsoon depression stages of developing tropical cyclones bringing periods of heavy rain showers to the region. The weather for the next few months in Chuuk State will feature periods of heavy rain showers with some several-day breaks of hot, dry weather. One or two occurrences of gale-force wind associated with a developing tropical cyclone may affect Chuuk Lagoon or atolls to the north, especially in the fall of 2012. This represents a near normal risk of hazardous effects from tropical cyclones.

During the year after El Niño, or more precisely, during the year that El Niño wanes and returns to ENSO-neutral or La Niña, the January through April or May of that year is typically drier than normal. This possibility is reflected in the forecasts below.

Predictions for Chuuk State from July 2012 through June 2013 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>			
	<b>Chuuk Lagoon, Losap, and Nama</b>	<b>Polowat</b>	<b>Northern Islands</b>	<b>Southern Mortlocks</b>
Jul - Sep 2012	<b>120%</b> <b>(45.84 inches)</b>	<b>90%</b> <b>(32.57 in)</b>	<b>120%</b> <b>(45.84 in)</b>	<b>120%</b> <b>(45.84 in)</b>
Oct - Dec 2012	<b>120%</b>	<b>95%</b>	<b>100%</b>	<b>120%</b>
Jan - Mar 2013	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>90%</b>
Apr - Jun 2013	<b>90%</b>	<b>85%</b>	<b>85%</b>	<b>95%</b>

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

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**Pohnpei State:** During the first half of 2012, rainfall totals ranged from below normal (e.g., Pingelap and Mwoakilloa), to near normal (e.g., Pohnpei WSO), to above normal (e.g., Palikir and Kapingamarangi). May was very wet on Pohnpei Island, and June was extremely wet at Kapingamarangi. A dry spell that began in late March and continued into early April affected some of the northern islands of Chuuk State, Pohnpei Island and the eastern islands of Pohnpei State, Kosrae, and some of the northern atolls of the RMI. This dryness on Pohnpei Island and some of the eastern atolls caused many residents to be concerned. The PEAC in coordination with the Guam and Pohnpei weather offices made a very good forecast that the dryness would not last long, and that normal to above-normal rainfall would return within a few weeks (i.e., by May) to most of Pohnpei State. Palikir's 2012 first half total of 122.75 inches was the highest in Pohnpei State, and the highest among all observing locations in Micronesia.

Pohnpei State Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
Pohnpei Island						
Pohnpei WSO	Inches	8.31	23.03	14.86	46.20	83.03
	% Norm	51%	120%	87%	88%	92%
Palikir	Inches	18.52	26.10	19.36	63.98	122.75
	% Norm	104%	126%	105%	112%	126%
Kolonias Airport	Inches	7.57	26.18	13.56	47.31	84.78
	% Norm	56%	167%	96%	109%	115%
Atolls of Pohnpei State						
Nukuoro	Inches	12.29	14.14	11.60	38.03	90.21
	% Norm	82%	96%	95%	91%	116%
Pingelap	Inches	8.29	12.77	10.03	31.09	65.02
	% Norm	48%	75%	62%	62%	73%
Mwoakilloa	Inches	5.64	11.64	11.79	29.07	56.33
	% Norm	42%	74%	84%	67%	76%
Kapingamarangi	Inches	13.91	17.24	24.68	55.83	86.20
	% Norm	102%	167%	340%	179%	131%

**Climate Outlook:** Near-normal to above-normal rainfall is anticipated on Pohnpei Island and the atolls of Pohnpei State for the next several months. The heart of the dry season at Kapingamarangi is during August through October, when normal monthly rainfall is typically between 4-6 inches. Because of persistent heavy showers anchored near the equator (a typical effect of El Niño), it is likely to remain much wetter than normal at Kapingamarangi through the upcoming months of its normal dry season. Unless it is El Niño, tropical storms and typhoons do not typically affect Pohnpei State. With El Niño developing in the latter half of 2012, it is likely that a few tropical disturbances and perhaps a monsoon depression or two will pass through the

## LOCAL SUMMARY AND FORECAST

State contributing to abundant rainfall. As the El Niño matures and begins to wane in early 2013, it is possible that persistent moderate dryness could occur throughout Pohnpei State during January through April 2013, but severe dry conditions are not expected at this time.

Predicted rainfall for Pohnpei State from July 2012 through June 2013 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>	
	Pohnpei Island and atolls	Kapingamarangi
Jul - Sep 2012	110% (56.08 inches)	120% (26.98 inches)
Oct - Dec 2012	100%	100%
Jan - Mar 2013	90%	100%
Apr - Jun 2013	90%	90%

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

**Kosrae State:** Every month except February was drier than normal across Kosrae during the first half of 2012. The dryness in early 2012 was likely due to a residual La Niña pattern of rainfall that had dominated during 2011. Continued dryness at Kosrae for the 2nd Quarter of 2012 is not anticipated. Despite the dry pattern, rainfall deficits were not extreme, and there were no reported problems with water supplies.

Kosrae State Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
Airport (SAWRS)	Inches	14.70	15.35	14.56	44.61	89.02
	% Norm	68%	82%	77%	74%	82%
Utwa	Inches	14.05	14.66	14.03	42.74	86.25
	% Norm	65%	81%	74%	72%	79%
Tofol	Inches	14.50*	12.60	12.25	39.35	79.85
	% Norm	67%	67%	64%	66%	73%
Nautilus Hotel	Inches	15.69	17.58	13.28	46.55	93.56
	% Norm	72%	94%	70%	78%	86%

**Climate Outlook:** Near-normal rainfall is anticipated on Kosrae for the next few months. As El Niño develops in the latter half of 2012, it is possible that one or two tropical cyclones in the tropical depression stage or weak tropical storm stage will pass to the north of the island and bring heavy rain and gusty (20-25 kt) southwesterly winds. In the past ten years, dominated by La Niña, there have not been any notable episodes of strong southwesterly winds at Kosrae. As El Niño matures and begins to wane in early 2013, it is possible that persistent moderate dryness could occur across Kosrae during January through April 2013, but severe dry conditions are not expected at this time.

Predicted rainfall for Kosrae State from July 2012 through June 2013 is as follows:

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Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>
July - September 2012	<b>95%</b> <b>(48.17 inches)</b>
October - December 2012	<b>100%</b>
January - March 2013	<b>85%</b>
April - June 2013	<b>90%</b>

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



**Republic of Palau:** Rainfall throughout the Republic of Palau was generally near normal during the first half of 2012, ranging from a six-month total of 56.58 inches (86%) at Peleliu to 71.92 inches (109%) at the Palau International Airport. The six-month totals at Koror and Nekken were between these two with 63.31 inches (96%) and 67.96 inches (103%), respectively. This distribution of rainfall is typical; although last year, Koror had the highest 2011 first-half total with 103.03 inches during what was to become the island nation's wettest year on record! Half of 2012's eight early season tropical cyclones developed close enough to Palau to bring some heavy showers accompanied by moderately gusty southwest winds. In general, residents of Palau perceived their weather and climate of the first half of 2012 to be normal. Of note: the sea level at Palau increased by over three inches from May to June to stand at +9.0 inches above normal. At other islands, the sea level did not increase further, or saw a slight fall. During El Niño, the sea level typically falls at Palau and across Micronesia. Please refer to the sea level discussion later in this newsletter for more information.

Republic of Palau Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
<b>WSO Koror</b>	<b>Inches</b>	8.79	14.49	16.54	<b>39.82</b>	<b>63.31</b>
	<b>% Norm</b>	101%	121%	96%	<b>105%</b>	<b>96%</b>
<b>Nekken</b>	<b>Inches</b>	7.90	17.28	16.83	<b>42.01</b>	<b>67.96</b>
	<b>% Norm</b>	91%	144%	97%	<b>111%</b>	<b>103%</b>
<b>Intl. Airport</b>	<b>Inches</b>	12.26	14.28	17.12	<b>43.66</b>	<b>71.92</b>
	<b>% Norm</b>	141%	119%	99%	<b>115%</b>	<b>109%</b>
<b>Peleliu</b>	<b>Inches</b>	7.76	12.58	11.05	<b>31.39</b>	<b>56.58</b>
	<b>% Norm</b>	90%	105%	64%	<b>83%</b>	<b>86%</b>

**Climate Outlook:** In the anticipated onset of El Niño, Palau should continue to receive normal or above-normal rainfall for the next few months. Were the El Niño to become moderate or strong, then persistent dryness may become established at the end of the year and extend into early 2013. For now, the forecasts below reflect a moderate drying in early 2013. Two or three episodes of gusty (25 to 35 kt) southwest winds are anticipated in the coming months, with the greatest risk of these

## LOCAL SUMMARY AND FORECAST

events during late August through November. No direct strike of Palau by a tropical cyclone is expected, although if it were to occur, it would likely be late in the year (i.e., late November through December).

Predicted rainfall for Palau from July 2012 through June 2013 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>
July - September 2012	<b>120%</b> <b>(53.82 inches)</b>
October - December 2012	<b>100%</b>
January - March 2013	<b>85%</b>
April - June 2013	<b>90%</b>

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

**Republic of the Marshall Islands (RMI):**

Rainfall during the 1st half of 2012 was near normal to below normal across the RMI. Most monthly totals were at or below 10 inches at all atolls. One notable exception was the 10.82 inches at Kwajalein during May 2012, which was due in large part to a three-day wet spell with a total of 7.74 inches. The June daily rainfall distribution on Kwajalein was even more lopsided with 5.52 inches of the June total of 8.08 inches falling on a single day! The total that day was the 8th highest 24-hour rainfall recorded on Kwajalein in its post WWII climate time series. Otherwise, persistent moderate dryness was the dominant pattern, and there were some water supply concerns. On Majuro, the municipal drinking water reservoir (with a capacity of 33 million gallons) had fallen to 17 million gallons. To keep up with demand, there must be roughly ten inches of rainfall per month. Otherwise, the reservoir levels fall, and very strict water hours are put in place.

RMI Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
RMI Central and Southern Atolls						
<b>Majuro WSO</b>	<b>Inches</b>	9.14	5.96	8.89	<b>23.99</b>	<b>49.47</b>
	<b>% Norm</b>	89%	53%	77%	<b>73%</b>	<b>88%</b>
<b>Arno</b>	<b>Inches</b>	10.63	5.06	7.89	<b>23.58</b>	<b>44.76</b>
	<b>% Norm</b>	103%	45%	68%	<b>71%</b>	<b>80%</b>
<b>Mili</b>	<b>Inches</b>	6.12	7.41	10.62	<b>24.15</b>	<b>36.37</b>
	<b>% Norm</b>	60%	66%	92%	<b>73%</b>	<b>65%</b>
<b>Aling-laplap</b>	<b>Inches</b>	4.29	5.88	8.65	<b>18.82</b>	<b>31.60</b>
	<b>% Norm</b>	48%	56%	82%	<b>63%</b>	<b>67%</b>
<b>Jaluit</b>	<b>Inches</b>	5.32	6.44	8.90	<b>20.66</b>	<b>38.88</b>
	<b>% Norm</b>	52%	58%	77%	<b>63%</b>	<b>70%</b>

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RMI Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	June	2nd Qtr	1st Half
RMI Central Atolls (6° N - 8° N)						
Kwajalein	Inches	3.58	10.82	8.08	22.48	31.66
	% Norm	47%	108%	84%	83%	81%
Wotje	Inches	0.20**	4.32	4.23	8.75	N/A
	% Norm	3%	46%	46%	34%	N/A

\*\* Value may be a partial monthly reading.

**Climate Outlook:** As El Niño develops in the latter half of 2012, rainfall should be near normal to above normal through the end of the year. Were the El Niño to become moderate or strong, then the first few months of 2013 could see some persistent dryness with impacts on water supply. For now, a short period of moderate dryness in early 2012 is indicated in the forecasts below.

Predicted rainfall for the RMI from July 2012 through June 2013 is as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) <sup>1</sup>		
	South of 6°N	6°N to 8°N	North of 8°N
July - Sept 2012	100% (36.94 inches)	110% (40.63 in)	110% (39.90 in)
Oct - Dec 2012	100%	120%	120%
Jan - Mar 2013	100%	90%	85%
Apr - June 2013	90%	90%	90%

<sup>1</sup> Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



**Hawaii:** After the torrential rains experienced at the beginning of March 2012 on the western islands of Hawaii, the 2012 dry season started rather quickly in April 2012. April also marked the fourth year in a row where drought had persisted through the rainy season in Hawaii. Lower than normal rainfall in April kept leeward areas of Maui and the Big Island under extreme and severe drought conditions. Severe drought conditions cover the island of Lanai, while extreme drought conditions still persist in areas of Molokai.

Strong trade winds persisted for most of the month of May. Typical summertime trade wind weather patterns returned in June. There were a few upper-level disturbances in the area in June, but the inversion had been so strong that they did not have much influence on the weather, except for some days with increased high clouds. Below-normal rainfall during the second quarter of 2012 has already produced drought impacts over por-

## LOCAL SUMMARY AND FORECAST

tions of Kauai and Oahu, both of which were drought free for the first few months of the year. Moderate drought has returned over the southeast half of Kauai and over leeward Oahu.

A summary of drought impacts in the state include: On Kauai, degraded pastures have been reported and ranchers having to reduce their herd size. On Oahu, pastures have also deteriorated and some ranchers have had to destock in the Waialua and Makakilo areas of the island. On Molokai, there is still a mandatory 30% reduction in irrigation water usage. On Lanai, pastures and general vegetation conditions have been very poor. On Maui, Pastures and general vegetation have been extremely dry especially on the leeward side of the island causing some ranchers to wean their cattle 2-3 months early to destock the pastures. Significant brush fires have also been burning this past month on Maui. On the Big Island over south Kau, a large brush fire damaged coffee and macadamia nut plants, and pastures. Pastures and general vegetation over most of the south Kohala District and portions of the north Kona District were in very poor condition. There is a very high risk of brush fires taking place in these areas. Ranchers have already destocked cattle, and water hauling continues as it has for many months.

State of Hawaii Rainfall Summary 2nd Quarter and 1st Half of 2012						
Station		Apr.	May	Jun.	2nd Qtr	1st Half
Lihue Airport	Inches	0.37	1.02	0.45	1.84	33.22
	%Norm*	19%	68%	35%	39%	124%
Honolulu Airport	Inches	0.24	0.05	0.07	0.36	7.56
	%Norm*	46%	13%	39%	33%	83%
Kahului Airport	Inches	0.34	0.59	0.40	1.33	4.02
	%Norm*	38%	120%	444%	90%	31%
Hilo Airport	Inches	6.63	6.56	6.36	19.55	50.74
	%Norm*	74%	89%	100%	86%	47%

\* Hawaii station normals are defined as 1981-2010 CPC median values.

**Climate Outlook:** The following comments are from the U.S. Climate Prediction Center's Hawaiian Seasonal Forecast Discussion: Below normal temperatures are favored for Hawaii from August-September-October 2012 to November-December-January 2012-2013. The NCEP models show below-median precipitation for Hawaii from August-September-October 2012 to January-February-March 2013.

The next long-lead outlook will be issued by the Climate Prediction Center on August 16th.

**For more information on  
weather and climate in Hawai'i go to:**

<http://www.prh.noaa.gov/pr/hnl/> or  
[www.cpc.noaa.gov/products/predictions/long\\_range/fxhw40.html](http://www.cpc.noaa.gov/products/predictions/long_range/fxhw40.html)

**3rd Quarter, 2012**

## Seasonal Sea-Level Outlook for the US-Affiliated Pacific Islands

The following sections describe: (i) the Canonical Correlation Analysis (CCA) forecasts for seasonal (mean and maxima) sea-level deviations for the forthcoming seasons July-August-September (JAS), August-September-October (ASO), and September-October-November (SON) of 2012, (ii) the observed monthly mean and maximum sea-level deviations for the season April-May-June (AMJ) 2012, (iii) forecast verifications for AMJ 2012 (observed/forecast values), and (iv) A Synopsis of ENSO and seasonal sea level variability. Note that the deviations are defined as ‘the difference between the mean sea level for the given month and the 1975 through 1995 mean sea level value computed at each station’. Also note that the CCA-forecasting technique adapted here does not account for sea-level deviations created by other atmospheric or geological factors such as tropical cyclones, storm surges or tsunamis.

**(i) Seasonal Sea-Level Forecast** (deviations with respect to climatology) for JAS, ASO, and SON 2012 (Table 1). Forecasts of the sea-level deviations in the USAPI (see <http://www.prh.noaa.gov/peac/map.php> for location of stations) are presented using CCA statistical model based on the independent SST values in AMJ 2012, the resulting CCA model has been used to forecast the sea-level of three consecutive seasons: JAS, ASO, and SON (see table 1). All the tide gauge stations (at 0 to 2-months lead time) show skillful forecasts for these three consecutive seasons. Consistent with the on-going La Niña event, the sea levels in these islands are higher than normal.

**Table 1: Forecasts of sea-level deviation (in inches) for JAS, ASO, and SON 2012.**

Tide Gauge Station	Seasonal Mean Deviations <sup>1</sup>				Seasonal Max Deviations <sup>2</sup>					
	JAS	ASO	SON	Forecast Quality <sup>3</sup>	JAS	ASO	SON	Forecast Quality <sup>3</sup>	Return Period <sup>4</sup> for JAS Season	
Lead Time <sup>5</sup>	0	1M	2M		0	1M	2M		20 Year	100 Year
Marianas, Guam	+6	+5	+3	Good	+23	+21	+20	Good	6.3	10.9
Malakal, Palau	+6	+6	+5	V. Good	+42	+42	+41	V. Good	8.1	10.2
Yap, FSM	+6	+5	+4	V. Good	+32	+32	+32	V. Good	8.4	11.3
Chuuk, FSM**	+6	+5	+4	N/A	+32	+32	+32	N/A	N/A	N/A
Pohnpei, FSM	+2	+2	+3	V. Good	+30	+31	+32	V. Good	5.8	7.0
Kapingamarangi, FSM	+1	+1	+2	Good	+25	+26	+27	Fair	3.5	4.2
Majuro, RMI	+1	+2	+3	Good	+41	+42	+43	Good	5.2	6.8
Kwajalein, RMI	+2	+2	+2	Good	+40	+40	+40	Good	4.1	5.2
Pago Pago, AS	+2	+2	+2	V. Good	+26	+26	+26	Good	4.1	5.4
Honolulu, Hawai'i	+2	+2	+2	Fair	+21	+20	+20	Fair	3.4	5.7
Hilo, Hawai'i	+2	+2	+2	Good	+24	+24	+23	Fair	6.4	7.7

**Note:** (-) indicates negative deviations (fall of sea level from the mean), and (+) indicates positive deviations (rise of sea level from the mean); N/A: data not available. Deviations from -1 to +1 inch are considered negligible, and deviations from -2 to +2 inches are unlikely to cause any adverse climatic impact. Forecasts for Chuuk (\*\*) are estimated subjectively based on information from WSO Chuuk and observations from neighboring stations of Pohnpei and Yap. See [http://www.prh.noaa.gov/peac/peu/2012\\_3rd/sea\\_level.php#footnote](http://www.prh.noaa.gov/peac/peu/2012_3rd/sea_level.php#footnote) for explanations of footnotes 1 through 5.

**Remarks:** The forecasts values of sea level for JAS, ASO, and SON seasons indicate that some of the stations (i.e., Guam, Malakal, and Yap) are likely to be about 4-6 inches higher than normal in the forthcoming seasons. Other stations Pohnpei, Majuro, Kwajalein, and Pago Pago are likely to be 1-3 inches higher than normal during the same time period. Here in Hawai'i, both Honolulu and Hilo are likely to be 2 inches higher than normal.

Falling sea levels in some of the north Pacific Islands are supportive to the on-going ENSO conditions. According to CPC-IRI's ENSO Alert System Status, there is an El Niño watch in place and the chance for an El Niño beginning in JAS 2012 is high. Currently the SST warming in the NINO 3.4 area appears to be consistent with a weakening of the low-level trade winds across the east-central equatorial Pacific. The observations are consistent with ENSO-neutral, but reflect a likely progression towards El Niño. This is the reason for which we see a trend of falling sea levels recently. This trend may continue in the coming months.

**Pacific ENSO Update is Now Available Online:**

Visit <http://www.prh.noaa.gov/peac/update.php>  
to receive notification when the newsletter is available online.

## Seasonal Sea-Level Outlook for the US-Affiliated Pacific Islands

## (ii) Observed Monthly Sea Level Deviation in the AMJ 2012 Season

The monthly time series for sea level deviations have been taken from the UH Sea Level Center. The full time series (in mm) for monthly mean is available at: <ftp://ilikai.soest.hawaii.edu/islp/slpp/deviations>. Locations of these stations can be found at: <http://www.prh.noaa.gov/peac/map.php>.

Table 2: Monthly observed max/mean sea-level deviations in inches, with year-to-year standard deviations

Tide Gauge Station	Monthly Mean Deviations <sup>1</sup>				Monthly Max Deviations <sup>2</sup>			
	Apr	May	June	Standard Deviations	Apr	May	June	Standard Deviations
Marianas, Guam	+8.7	+9.0	+8.4	3.7	+24	+24	+24	3.9
Malakal, Palau	+5.3	+5.7	+9.5	4.0	+42	+42	+44	3.8
Yap, FSM	+5.2	+8.5	+7.7	3.4	+32	+37	+34	4.0
Chuuk, FSM*	*	*	*	*	*	*	*	*
Pohnpei, FSM	+9.2	+8.1	*	2.2	+40	+37	*	2.7
Kapingamarangi, FSM	*	*	*	2.8	*	*	*	3.1
Majuro, RMI	+8.0	+7.0	*	1.8	+48	+48	*	2.9
Kwajalein, RMI	+8.5	+5.7	+6.9	2.3	+48	+44	+42	2.7
Pago Pago, American Samoa	+10.0	+8.9	+6.4	3.7	+33	+35	+32	4.2
Honolulu, Hawai'i	0.0	0.0	0.0	1.8	+16	+18	+20	1.9
Hilo, Hawai'i	0.0	+2.0	-1.5	2.0	+18	+25	+22	2.4

\* Data currently unavailable; <sup>1</sup> Difference between the mean sea level for the given month and the 1975 through 1995 mean sea level value at each station; <sup>2</sup> Same as <sup>1</sup> except for maxima.

**Remarks:** A synopsis of the sea-level variability for the last six months (February-July 2012) is as follows: 1) In February, all stations recorded slight rise except Palau; 2) In March, all stations recorded moderate rise; 3) In April, most of the stations recorded fall except Pago Pago, which recorded slight rise; 4) In May, most of the stations recorded slight fall except Guam and Pohnpei; 5) In June, all stations recorded slight fall except Malakal and Kwajalein; and 6) Currently (in July), all north pacific stations are 5 to 10 inches higher than normal.

## (iii) ENSO and Seasonal Sea Level Variability: A Synopsis

Seasons	Seasonal Mean Deviations: Observed rise/fall (inches)					
	AMJ 12 (ENSO neutral-El Nino watch)	AMJ 11 (Moderate- to-weak La Nina)	JFM98 (Strong El Nino)	JFM99 (Strong La Nina)	OND 97 (Strong El Nino)	OND 98 (Strong La Nina)
Marianas, Guam	+9	+8	-6	+7	-7	+8
Malakal, Palau	+6	+3	-9	+8	-7	+9
Yap, FSM	+7	+2	-7	+6	-9	+7
Pohnpei, FSM	+9	+7	-5	+4	-10	+8
Majuro, RMI	+7	+4	-2	+2	-9	+6
Kwajalein, RMI	+7	+4	-4	+3	-7	+3
Pago Pago	+9	+9	-6	+4	+2	+7

**Remarks:** As the sea level in the USAPI is very sensitive to the phase of the ENSO climate cycle, a perspective of sea-level anomalies during the recent ENSO event (2011-12) and the historically strongest ENSO events of 1997-99 is presented in table 3, to the left. The objective is to provide context to the readers about the relative strength of the current phase of ENSO. Note that 1997 was a strong El Nino year and 1998 was a strong La Nina year.

**For more information on the  
PEAC Seasonal Sea Level  
Outlook go to:**

<http://www.prh.noaa.gov/peac/sea-level.php>

Table 3: Sea-Level Deviation in Current and Major ENSO Years

# Pacific ENSO Update

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## Excerpts from El Niño/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

Issued by NOAA NWS Climate Prediction Center - 5 July 2012

[http://www.cpc.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/index.shtml](http://www.cpc.noaa.gov/products/analysis_monitoring/enso_advisory/index.shtml)

### ENSO Alert System Status: El Niño Watch

*Synopsis: Chances increase for El Niño beginning in July-September 2012.*

During June 2012, ENSO-neutral continued as reflected in both the oceanic and atmospheric anomalies. However, positive equatorial Pacific sea surface temperature (SST) anomalies have grown, exceeding +0.5°C across the eastern Pacific Ocean by the end of June. SST anomalies increase moving from the westernmost Niño 4 region to the Niño 1+2 region adjacent to South America, which remained near +1.5°C during the month. The oceanic heat content anomalies (average temperature in the upper 300m of the ocean) increased during June, as above-average sub-surface temperatures became more entrenched in the equatorial Pacific. This warming was consistent with a weakening of the low-level trade winds across the east-central equatorial Pacific, along with a weakening of the persistent pattern of enhanced convection near Papua New Guinea. The observations are consistent with ENSO-neutral, but reflect a likely progression towards El Niño.

There continues to be a substantial disparity between the statistical and dynamical model SST forecasts for the Niño-3.4 region. The dynamical models, including the NCEP Climate Forecast System (CFS), largely favor the development of El Niño by July-September 2012, while the majority of statistical models predict ENSO-neutral through the rest of 2012. The forecaster consensus largely favors the dynamical model outcome because those models tend to exhibit greater skill emerging from the Northern Hemisphere “spring barrier” (a period of relatively low confidence ENSO forecasts) and also due to the strengthening of observed signals indicating an evolution towards El Niño. Overall, the forecaster consensus reflects increased chances for El Niño beginning in July-September 2012 (see CPC/IRI consensus forecast).

This discussion is a consolidated effort of the National Oceanic and Atmospheric Administration (NOAA), NOAA’s National Weather Service, and their funded institutions. Oceanic and atmospheric conditions are updated weekly on the Climate Prediction Center web site (El Niño/La Niña Current Conditions and Expert Discussions). Forecasts for the evolution of El Niño/La Niña are updated monthly in the Forecast Forum section of CPC's Climate Diagnostics Bulletin. The next ENSO Diagnostics Discussion is scheduled for 9 August 2012. To receive an e-mail notification when the monthly ENSO Diagnostic Discussions are released, please send an e-mail message to: [ncep.list.ens-update@noaa.gov](mailto:ncep.list.ens-update@noaa.gov).

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The Pacific ENSO Update is a bulletin of the Pacific El Niño-Southern Oscillation (ENSO) Applications Climate (PEAC) Center. PEAC conducts research & produces information products on climate variability related to the ENSO climate cycle in the U.S.-Affiliated Pacific Islands (USAPI). This bulletin is intended to supply information for the benefit of those involved in such climate-sensitive sectors as civil defense, resource management, and developmental planning in the various jurisdictions of the USAPI.

The Pacific ENSO Update is produced quarterly both online and in hard copy, with additional special reports on important changes in ENSO conditions as needed. For more information about this issue please contact the editor, LTJG Charlene Felkley, at [peac@noaa.gov](mailto:peac@noaa.gov) or at the address listed below.

PEAC is part of the Weather Forecast Office (WFO) Honolulu’s mission and roles/responsibilities. All oversight and direction for PEAC is provided by the Weather Forecast Office Honolulu in collaboration with the Joint Institute for Marine and Atmospheric Research (JIMAR) at the University of Hawaii. Publication of the Pacific ENSO Update is supported by the National Oceanic and Atmospheric Administration (NOAA), National Weather Service-Pacific Region Climate Services. The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA, any of its sub-agencies, or cooperating organizations.

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## ACKNOWLEDGEMENTS AND FURTHER INFORMATION

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LTJG Charlene Felkley, PEAC Outreach Officer, at 808-956-2324 for information on PEAC, the Pacific ENSO Update and ENSO-related climate data for the Pacific Islands.

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